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THE SALT TOLERANCE OF PLANTS

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Salinity is a problem in some areas of Hawaii. Salinity is often induced in soils by the application of fertilizer, manures and other materials containing soluble salts. It is important to know plant tolerance to salts in order to choose those plants best adapted to the conditions found in your soils or to adapt soil management practices that will promote suitable conditions for growing plants.

Factors Affecting Plant Tolerance

Plants vary in their ability to grow in soils containing soluble salts. This response to salt levels in the soil depends upon the plant species, variety, age of the plant, soil texture, moisture content of the soil, and the kind and amount of salt causing salinity.

Many species of plants have been classified according to their tolerance for salt levels in the soil. These are listed in Table 1. Varietal differences are significant for those plants with high tolerance but are of little or no significance for those with moderate to low tolerance. Plants are much more susceptible to salinity during germination; even those with high salt tolerance are quite susceptible during the germination phase or when transplanted. However, after the salt accumulates, it is more difficult to remove salts from them or reduce salt damage to plants grown in them. The presence of salts in the soil increases the difficulty of water availability to plants. As the soil becomes drier, this effect is aggravated. It is necessary to keep the soil moist at all times to allow continuous leaching actions, maintain adequate water for plant use, and reduce the effect of salts upon the plant. Plants respond differently to different kinds of salts in the soil. Generally the more soluble the salt and the less the salt is necessary for plant nutrition, the less tolerance is exhibited by the plant.

Relative Salt Tolerance of Plants

The salt tolerance of a plant may be determined by: (1) its ability to germinate in saline soils, (2) its ability to survive in saline soils, (3) the yield of the crop when grown in saline soils and (4) the relative yield on a saline soil as compared with a non-saline soil. The last method has been used to determine the salt tolerance of plants as it provides a basis of comparison among diverse crops. The relative tolerances shown in Table 1 generally based upon the usual climatic conditions where the crop is grown. Plants may survive at salinity levels above those shown but growth, yield, and quality will be severely restricted.

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Table 1. Relative Salt Tolerance Of Some Plants[1]

Low Tolerance		Moderate Tolerance	High Tolerance	
0	2	4	10	16
Little or no effect. Any plant can be grown	Very sensitive plants will be affected	Low tolerance plants cannot be grown	Only tolerant plants can be grown	Only a few very tolerant plants can be grown
green beans	avocado	broccoli	asparagus	sans sevier
	banana	cabbage	bermuda grass	
	celery	cantaloupe	bougainvillaea	
	grapefruit	carrot	coconut	
	lemon	carnations	date palm	
	lime	castor beans	garden beets	
	orange	cauliflower	ornamental palms	
	papaya	corn	spinach	
	radish	corn, sweet	zoysia grass	
	soybeans	chrysanthemum		
	sugar cane	cucumber		
	tangerine	fig		
	coleus	grape		
		guava		
		lettuce		
		lychee		
		macadamia nut		
		mango		
		onion		
		passion fruit		
		peas		
		pepper, hot		
		pepper, sweet		
		pineapple		
		pomegranate		
		potatoes, irish		
		potatoes, sweet		
		pummelo		
		rice		
		St. Augustine grass		
		sorghum		
		squash		
		sunflower		
		tomato		
		most flowering plants		
		most ornamental plants		

[1]The numbers are salinity or millimhos/cm at 25°C in soil solution.

[2]Plants in each salinity range can be grown under salinity conditions lower than those shown but not at higher levels.